

Reality successfully licensed the “Infernal Engine” to other video game developers for use in their video games.

3. On June 3, 2014, TRI entered into an exclusive license agreement with Infernal entitled Exclusive License Agreement and Exclusive Right to Enforce pertaining to the TRI Patents. On June 12, 2015, TRI and Infernal entered into another exclusive license agreement also entitled Exclusive License Agreement and Exclusive Right to Enforce that replaced the prior agreement (the “2015 Exclusive License Agreement”). Pursuant to the 2015 Exclusive License Agreement, TRI, the owner of the TRI Patents, granted Infernal the exclusive right to enforce those patents.

4. Defendant Epic Games Inc. (“Epic Games”) is a corporation organized and existing under the laws of the State of Maryland, with its principal place of business located at 620 Crossroads Boulevard, Cary, North Carolina, 27518. Epic Games may be served with process through its registered agent CT Corporation System, 160 Mine Lake Court, Suite 200, Raleigh, North Carolina, 27518.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the patent laws of the United States of America, Title 35, United States Code. This Court has original jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. Epic Games is engaged in the business of developing, testing, publishing, distributing, and selling video games. Many of these video games employ game “engines” which are tools available for video game designers to code and plan out a game. Epic Games developed and utilizes multiple iterations of the “Unreal Engine” to develop and run its portfolio of video games which infringe one or more claims of the patents asserted in this complaint (“Accused Game

Engines”). These Accused Game Engines include, but are not limited to all versions of Unreal Engine 4 (e.g., Unreal Engine 4.1, 4.2, etc.). The Accused Game Engines are game engines that are capable of performing deferred rendering, deferred shading and deferred lighting, used in video games developed, published, distributed, and/or sold by Epic Games.

7. The video games developed, published, distributed, and sold by Epic Games that use the Accused Game Engines include, but are not limited to *Fortnite*, *Robo Recall* and all other games developed, published, distributed, and/or sold by Epic Games that use the Accused Game Engines and are referred to herein as the “Accused Games.” Epic Games has developed, published, distributed, used, offered for sale and sold the Accused Games in the United States, including within this District.

8. The Accused Game Engines and Accused Games are collectively referred to herein as the “Accused Instrumentalities.”

9. Epic Games is subject to this Court’s specific personal jurisdiction because it (a) is a resident of the State of North Carolina; and (b) has designated an agent for service of process in the State of North Carolina; and (c) has committed acts of infringement in the State of North Carolina as alleged herein.

10. Venue is proper in this district under 28 U.S.C. §§ 1400(b). Epic Games has a regular and established business under § 1400(b) because it has a regular and established place of business located at 620 Crossroads Boulevard, Cary, North Carolina, 27518. Epic Games has committed acts of infringement in this District by selling, offering to sell and using the Accused Games in this District.

THE PATENTS-IN-SUIT

11. On March 26, 2002 the United States Patent and Trademark Office issued United States Patent No. 6,362,822 (the “’822 Patent”) entitled “Lighting and Shadowing Methods and Arrangements for use in Computer Graphic Simulations,” a true copy of which is attached as Exhibit 1.

12. On June 13, 2006, the United States Patent and Trademark Office issued United States Patent No. 7,061,488 (the “’488 Patent”) entitled “Lighting and Shadowing Methods and Arrangements for use in Computer Graphic Simulations,” a true copy of which is attached as Exhibit 2. The ’488 Patent is a continuation-in-part of the ’822 Patent. The ’822 and ’488 Patents are collectively referred to as the “Asserted Patents.” The inventor of the inventions described and claimed in the Asserted Patents is Mark Randel.

13. Infernal Technology is the exclusive licensee of the ’822 and ’488 Patents with the exclusive right to sue for and recover all past, present and future damages for infringement of the Asserted Patents.

14. The Asserted Patents are directed to methods and arrangements for use in rendering lighting and shadows in computer graphic simulation. As the specification of the ’822 Patent states, “[t]he present invention relates to computer graphics and, more particularly, to improved methods and arrangements for use in rendering lighting and shadows in computer graphic simulations, such as, for example, interactive computer graphics simulations of multi-dimensional objects.” *See* Exhibit 1 at 1:6-11. At the time of the invention of the ’822 patent, computer generated graphics were becoming popular due to increased processing capabilities of personal computers. *Id.* at 1:14-24. In particular, virtual three-dimensional (3D) worlds were being created for computer games that could be interactively explored by a user. These virtual 3D worlds consist

of a plurality of 3D objects, which are typically modeled by one or more polygons. *Id.* at 1:25-38. These objects are displayed to a user by projecting the objects onto a 2D frame as viewed from a particular viewpoint. *Id.*

15. The goal of 3D graphics rendering is to provide “a realistic, interactive virtual 3D world to the user.” *Id.* at 1:53-56. Because there is a limit to the amount of processing that a computer can provide, there has always been a need for faster, more efficient and higher quality means for producing the 3D to 2D renderings. *Id.* at 1:53-56. As the ’822 patent explains, “simplifications or other compromises often need to be made in modeling a 3D world,” and “[o]ne of the unfortunate compromises made in the past, has been in the area of lighting and, more particularly, in the area of rendering shadows cast by lighted 3D objects.” *Id.* at 1:49-50, 57-59. This is because “[m]any shadow rendering processes have been considered too compute intensive for most lower-end computer applications.” *Id.* at 1:59-63. The Asserted Patents, therefore, sought to provide improved shadow rendering methods and arrangements that would “support real time interactive graphics on conventional PCs and the like, and allow for multiple light sources to be modeled in a more efficient and realistic manner.” *Id.* at 2:66-3:3. This improved rendering is accomplished by operating on rendered pixels in 2D space and using a separate buffer to accumulate light falling on each pixel from multiple light sources.

16. Thus, the invention of the Asserted Patents provides improved methods and arrangements for use in producing lighting and shadows that operate in the 2D domain, after the three-dimensional scene has been rendered. The claimed methods and arrangements were not well-understood, routine, and conventional activities commonly used in industry. The graphics industry immediately recognized the groundbreaking innovations described in the ’822 Patent, commenting on the lighting and shadows rendered by Mr. Randel’s Nocturne game using the

patented invention: “[a]ll the hype surrounding the lighting in the game was for a really good reason -- Nocturne pushes videogame lighting to new heights, with shadows that are so inventive and interactive that you’ll swear you’re actually watching a film at times.”¹

THE ESTABLISHED VALIDITY OF THE PATENTS-IN-SUIT

17. On April 21, 2016, Electronic Arts Inc. (“EA”) petitioned the U.S. Patent Trial and Appeal Board (“PTAB”) for *inter partes* review of the ’822 and ’488 Patents (IPR2016-00928, IPR2016-00929, IPR2016-00930Z). In the IPR petitions, EA relied upon the following prior art references: (1) Segal, *et al.*, “Fast Shadows and Lighting Effects Using Texture Mapping,” *Computer Graphics Proceedings*, Volume 26, Number 2, July, 1992 (“Segal”); and (2) McReynolds, “Programming with OpenGL: Advanced Rendering,” SIGGRAPH ’96 Course, August, 1996 (“McReynolds”). With respect to the ’822 Patent, EA asserted that Claims 1-10 and 39-48 were unpatentable under 35 U.S.C. § 103 in view of Segal, and that Claims 1-20 and 39-48 were unpatentable under 35 U.S.C. § 103 as obvious over the combination of Segal and McReynolds. With respect to the ’488 Patent, EA argued that Claims 1-10, and 27-62 were unpatentable under Section 103 in view of Segal and that Claims 1-20 and 27-36 were unpatentable under Section 103 in view of Segal in combination with McReynolds.

18. On October 25, 2016, the PTAB instituted IPR proceedings as to all challenged claims of the ’822 and ’488 Patents. In addition to the Segal and McReynolds references asserted by EA in its petitions, the PTAB instituted IPR based on an additional prior art reference: James D. Foley, *et al.*, *COMPUTER GRAPHICS, PRINCIPLES AND PRACTICE*, 2^d ed. (1997) (“Foley”). Oral argument was heard by the PTAB on July 18, 2017. On October 19, 2017, and on October 23, 2017, the PTAB issued its Final Written Decisions in the IPR proceedings rejecting all of EA’s

¹ <http://www.ign.com/articles/1999/11/23/nocturne>.

challenges to the patentability of all claims of the '822 and '488 Patents in view of Segal, alone or in combination with McReynolds and/or Foley. Shortly thereafter, EA settled Plaintiffs' patent infringement claims and entered into a formal settlement agreement with Plaintiffs.

THE INFRINGING ACTIVITIES OF EPIC GAMES

19. Epic Games is engaged in the business of developing, testing, publishing, distributing, and/or selling video games. Many of these video games employ game “engines,” which are tools available for video game designers to code and plan out a game. Epic Games utilizes various game engines to run numerous video games published by them which infringe one or more claims of the patents asserted in this complaint. These game engines are capable of performing deferred rendering, deferred shading, deferred lighting, physically based shading, and/or physically based rendering used in video games developed, published, distributed, and/or sold by Epic Games. Epic Games also is engaged in the business of selling developing, testing, publishing, distributing video game engines through licensing exploits to third parties. The infringing game engines are collectively referred to herein as the “Accused Game Engines.” The infringing video games that use the Accused Game Engines are collectively referred to herein as the “Accused Games.”

20. The Accused Game Engines and Accused Games that infringe the asserted patents include, but are not limited to

	GAME	ENGINE	DEVELOPER(S)	PUBLISHER(S)
1	Fortnite	Unreal Engine 4	Epic Games	Epic Games
2	Robo Recall	Unreal Engine 4	Epic Games	Epic Games

GAME ENGINE	DEVELOPER
Unreal Engine 4 (and all subversions thereof)	Epic Games

CLAIM 1 -- INFRINGEMENT OF U.S. PATENT NO. 6,362,822

21. Plaintiffs incorporate paragraphs 1 through 21 as though fully set forth herein.

22. Epic Games has directly infringed one or more of the method claims of the '822 Patent by using one or more of those patented methods in the United States. In particular, Epic has been directly infringed one or more of the method claims of the '822 Patent in the United States, by using those methods through, among things, testing, displaying and demonstrating the Accused Instrumentalities in violation of 35 U.S.C. § 271(a). The Accused Instrumentalities perform the lighting and shadowing methods described and claimed in one or more of the method claims of the '822 Patent.

23. Each of the Accused Instrumentalities performs a rendering method, commonly known as deferred rendering, which meets the limitations of the asserted claims of the '822 Patent. Deferred rendering (also sometimes referred to as deferred shading) is a process for rendering a simulated, three-dimensional (3D) scene whereby the application of light to the scene is “deferred” until after the surface properties for the objects in the scene have been rendered.

24. For example, but not as a limitation, Epic Games' direct infringement of Claim 1 of the '822 Patent with respect to Accused Games use of Unreal Engine is shown in the claim charts provided in Exhibit 3.

25. As set forth in Exhibit 3, each of the Accused Instrumentalities performs a shadow rendering method for use in a computer system.

26. As set forth in Exhibits 3 and 5, each of the Accused Instrumentalities provides observer data of a simulated multi-dimensional scene.

27. As set forth in Exhibit 3, each of the Accused Instrumentalities provides lighting data associated with a plurality of simulated light sources arranged to illuminate the simulated multi-dimensional scene, said lighting data including light image data.

28. As set forth in Exhibit 3, for each of the plurality of light sources, each of the Accused Instrumentalities compares at least a portion of the observer data with at least a portion of the lighting data to determine if a modeled point within the scene is illuminated by the light source, and stores at least a portion of the light image data associated with the modeled point and the light source in a light accumulation buffer.

29. As set forth in Exhibit 3, each of the Accused Instrumentalities combines at least a portion of the light accumulation buffer with the observer data.

30. As set forth in Exhibit 3, each of the Accused Instrumentalities displays the resulting image data to a computer screen.

31. Because all of the Accused Instrumentalities perform deferred rendering/shading/lighting, and/or physically based shading/rendering as exemplified in Exhibit 3, any Accused Games employing any of the Accused Game Engines has infringed one or more of the method claims of the '822 Patent in a manner substantially the same as shown in the exemplary claim charts of Exhibit 3.

32. The duty to mark under 35 U.S.C. § 287 is inapplicable to the asserted method claims of the '822 Patent.

33. Plaintiffs have been damaged by Epic Games' activities of infringement of the '822 Patent.

34. Epic Games has had knowledge of the existence of the '822 Patent prior to the expiration of the patent. Epic Games, with knowledge of the '822 Patent, has been and is now indirectly infringing one or more of the method claims of the '822 Patent by inducing third-party end users of the Accused Games and third-party developers using the Accused Games and Accused Game Engines to develop video games to run the Accused Games or Accused Game Engines which directly infringe one or more of the method claims of the '822 Patent in violation of 35 U.S.C. § 271(b).

35. Upon information and belief, Epic Games has promoted use of the Accused Instrumentalities by third-party end users of the Accused Games and third-party developers using the Accused Instrumentalities, which perform one or more methods claimed in one or more of the method claims of the '822 Patent. Epic Games has promoted such use of the Accused Instrumentalities with the knowledge that such use would result in performance of one or more methods of one or more of the method claims of the '822 Patent. Performance of the lighting and shadowing methods claimed in one or more of the method claims of the '822 Patent is an essential part of the functionality of the Accused Instrumentalities. Upon information and belief, Epic Games provides third-party end users with instructions regarding how to install and use the Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of the '822 Patent. Upon information and belief, Epic Games works in conjunction with third-party developers to cause the third-party developers to run the Accused Instrumentalities during their development of the Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of the '822 Patent. Upon information and belief, Epic Games has intended to induce third-party

end users and video game developers to use the Accused Games or Accused Instrumentalities to perform one or more of the methods claimed in the method claims of the '822 Patent.

CLAIM 2 – INFRINGEMENT OF U.S. PATENT NO. 7,061,488

36. Plaintiffs incorporate paragraphs 1 through 36 as though fully set forth herein.

37. Epic Games has directly infringed one or more claims of the '488 patent by using the claimed inventions or making, importing, offering for sale, and/or selling video games embodying the patented inventions.

38. Epic Games has directly infringed one or more of the method claims of the '488 Patent by using one or more of those patented methods in the United States. Epic Games has used the lighting and shadowing methods claimed in the '488 Patent when end users of the Accused Games activate and play those games. When an end user plays the Accused Games, the code embedded in those games causes the devices on which they are played to perform the claimed methods without any user modification or intervention, all in violation of 35 U.S.C. § 271(a).

39. Epic Games has also directly infringed one or more of the method claims of the '488 Patent by using those claimed methods during development, testing and demonstration of the Accused Games, all in violation of 35 U.S.C. § 271(a).

40. For example, but not as a limitation, Epic Games' direct infringement of Claim 1 of the '488 Patent with respect to the Accused Games using the Unreal Engine is shown in the claim charts of Exhibit 4.

41. As set forth in Exhibit 4, each of the Accused Instrumentalities performs a shadow rendering method for use in a computer system.

42. As set forth in Exhibit 4, each of the Accused Instrumentalities provides observer data of a simulated multi-dimensional scene.

43. As set forth in Exhibit 4, each of the Instrumentalities provides lighting data associated with a plurality of simulated light sources arranged to illuminate the simulated multi-dimensional scene, said lighting data including light image data.

44. As set forth in Exhibit 4, for each of the plurality of light sources, each of the Accused Instrumentalities compares at least a portion of the observer data with at least a portion of the lighting data to determine if a modeled point within the scene is illuminated by the light source, and stores at least a portion of the light image data associated with the modeled point and the light source in a light accumulation buffer.

45. As set forth in Exhibit 4, each of the Accused Instrumentalities combines at least a portion of the light accumulation buffer with the observer data.

46. As set forth in Exhibit 4, each of the Accused Instrumentalities outputs the resulting image data.

47. Because all of the Accused Instrumentalities, upon information and belief, perform deferred rendering/shading/lighting, and/or physically based shading/rendering as exemplified in Exhibit 4, any Accused Games employing any of the Accused Game Engines infringed one or more of the method claims of the '488 Patent in a manner substantially the same as shown in the exemplary claim charts in Exhibit 4.

48. Because all of the Accused Game Engines, upon information and belief, are capable of performing deferred rendering/shading/lighting, and/or physically based shading/rendering as described above with respect to the example Accused Game Engines, each of the Accused Engines infringed in a manner similar to as shown in the exemplary claim charts in Exhibit 4.

49. Epic Games has had knowledge of the existence of the '488 Patent prior to the expiration of the patent. Epic Games, with knowledge of the '488 Patent, has been and is now

indirectly infringing one or more of the method claims of the '488 Patent by inducing third-party end users of the Accused Games and third-party developers using the Accused Games and Accused Game Engines to develop video games to run the Accused Games or Accused Game Engines which directly infringe one or more of the method claims of the '488 Patent in violation of 35 U.S.C. § 271(b).

50. Upon information and belief, Epic Games has promoted use of the Accused Instrumentalities by third-party end users of the Accused Games and third-party developers using the Accused Instrumentalities, which perform one or more methods claimed in one or more of the method claims of the '488 Patent. Epic Games has promoted such use of the Accused Instrumentalities with the knowledge that such use would result in performance of one or more methods of one or more of the method claims of the '488 Patent. Performance of the lighting and shadowing methods claimed in one or more of the method claims of the '488 Patent is an essential part of the functionality of the Accused Instrumentalities. Upon information and belief, Epic Games provides third-party end users with instructions regarding how to install and use the Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of the '488 Patent. Upon information and belief, Epic Games works in conjunction with third-party developers to cause the third-party developers to run the Accused Instrumentalities during their development of the Accused Games with the knowledge that doing so will result in performing one or more of the methods claimed in the method claims of the '488 Patent. Upon information and belief, Epic Games has intended to induce third-party end users and video game developers to use the Accused Games or Accused Instrumentalities to perform one or more of the methods claimed in the method claims of the '488 Patent.

51. Plaintiffs have been damaged by Epic Games' activities infringing the '488 Patent.

52. The duty to mark under 35 U.S.C. § 287 is inapplicable to asserted method claims of the '488 Patent, and Plaintiffs have otherwise complied with the marking requirement under 35 U.S.C. § 287, to the extent it is applicable.

PLAINTIFFS' NOTICE OF INFRINGEMENT TO EPIC GAMES, INC.

53. On February 27, 2019, Plaintiff's counsel sent a letter to Epic Games' CEO, Tim Sweeney, informing Epic Games about the Asserted Patents and providing Epic Games with copies of the Patents-in-Suit. In the letter, Plaintiff's counsel explained that the Patents-in-Suit "describe implementing improved lighting and shadow rendering methods useful in supporting real-time interactive graphics on conventional computers and gaming device," and that "[t]he Patents cover certain video-game rendering engines that rendering the lighting and shadows using a 'deferred-rendering' pipeline." Plaintiff's counsel informed Epic Games that, based on an analysis of the publicly available information on Unreal Engine 4, "Epic Games may require a license to the Patents." Epic Games did not respond to this letter.

DEMAND FOR JURY TRIAL

54. Plaintiffs, under Rule 38 of the Federal Rules of Civil Procedure, request a trial by jury of any issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs request the following relief:

1. A judgment in favor of Plaintiffs that Epic Games has directly and indirectly infringed, and/or has indirectly infringed by way of inducement, one or more claims of the Asserted Patents;
2. A judgment and order requiring Epic Games to pay Plaintiffs damages adequate to compensate for infringement under 35 U.S.C. § 284, which damages in no event shall be less than

a reasonable royalty for the use made of the inventions of the Asserted Patents, including pre- and post-judgment interest and costs, including expenses and disbursements; and

3. Any and all such further necessary relief as the Court may deem just and proper under the circumstances.

Dated: November 14, 2019

Respectfully submitted,

By: /s/ Lynne A. Borchers

Lynne A. Borchers

NC State Bar No. 32386

Peter D. Siddoway

NC State Bar No. 45647

SAGE PATENT GROUP, PLLC

4120 Main at North Hills Street

Suite 230

Raleigh, NC 27609

Telephone: (984) 219-3358

Facsimile: (984) 538-0416

Email: lborchers@sagepat.com

Email: psiddoway@sagepat.com

OF COUNSEL:

Eric W. Buether, Esq.

Christopher M. Joe, Esq.

Niky R. Bagley, Esq.

Michael D. Ricketts, Esq.

Nicholas C. Kliewer, Esq.

Michael C. Pomeroy, Esq.

**BUETHER JOE & CARPENTER,
LLC**

1700 Pacific Avenue

Suite 4750

Dallas, Texas 75201

Telephone: (214) 466-1271

Facsimile: (214) 635-1827

*Attorneys For Plaintiffs, Internal Technology,
LLC, and Terminal Reality, Inc.*